

A Revision of the *Nomada* Subgenus *Pachynomada* (Hymenoptera: Anthophoridae)

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Abstract.—The *Nomada* subgenus *Pachynomada* is revised. Fourteen species and subspecies are recognized, five of which are new to science. New species described are *Nomada bohartorum* Moalif n. sp., *N. dreisbachelorum* Moalif n. sp., *N. tepoztlan* Moalif n. sp., *N. utahensis* Moalif n. sp., and *N. saltillo* Broemeling n. sp., *Nomada vincta heterochroa* Cockerell is placed in synonymy with *N. vincta* Say. *Pachynomada* is kleptoparasitic upon the *Andrena* subgenus *Callandrena*.

The kleptoparasitic bee genus *Nomada* is found on nearly every continent. *Pachynomada* is a new world subgenus of late summer to fall bees, ranging from southern Canada to the mountains of southern Mexico. They are most frequently collected on or around large flowered composites, especially species of *Helianthus*. Males are often found in the afternoon, flying amongst the stems of *Helianthus*, possibly in search of females (pers. obs.). *Nomada (Pachynomada) utahensis* n. sp. has been reared from the nests of *Andrena (Callandrena) helianthi* Robertson (Parker and Bohart, 1982). This same *Nomada* species has been observed leaving an unplugged burrow of *Andrena (Callandrena) haynesi* Viereck and Cockerell in southeastern Utah (Parker and Griswold, 1983).

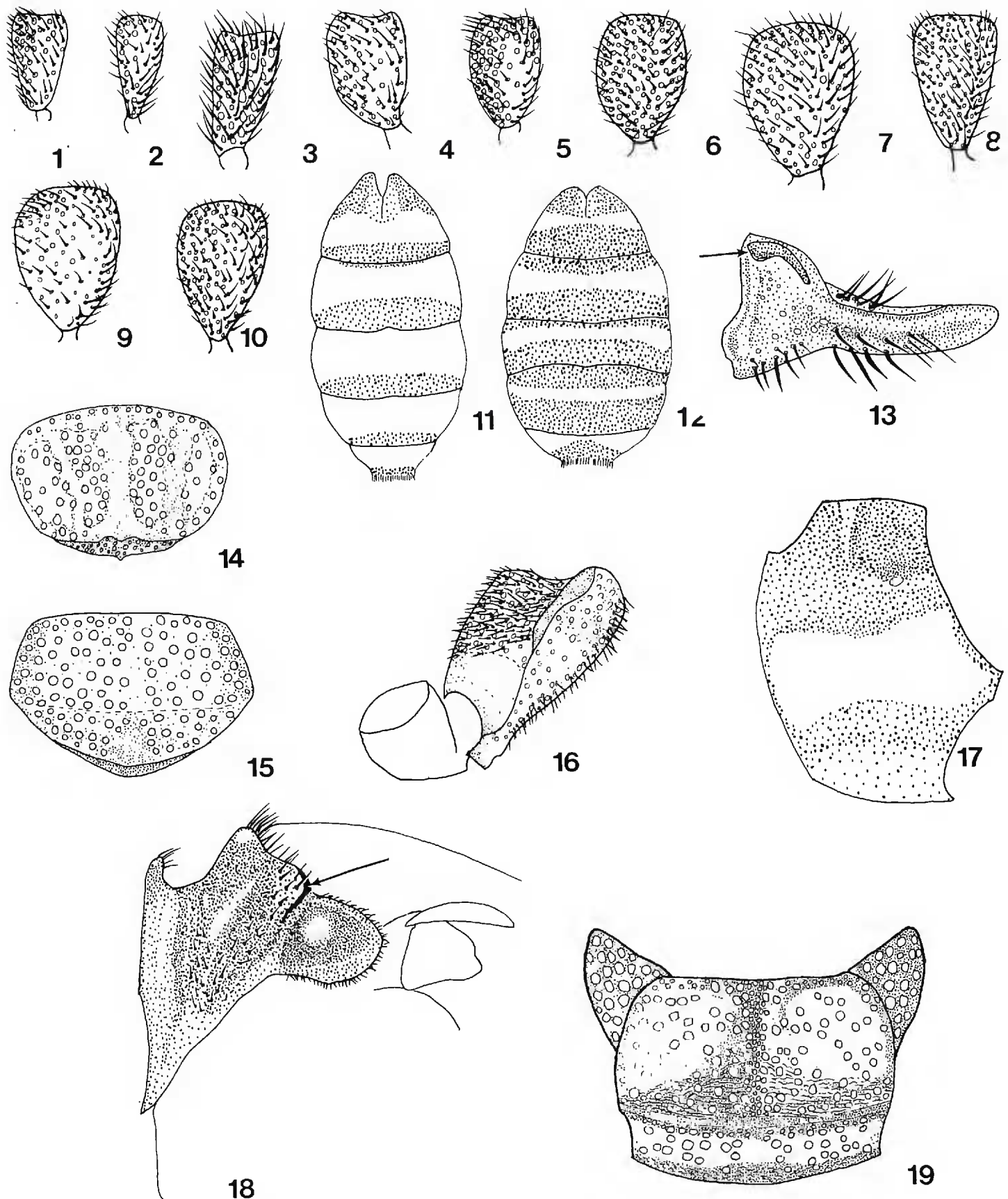
Rodeck (1945) described *Pachynomada* as a segregate of the subgenus *Holonomada*, with *Nomada vincta* Say as the type species. *Pachynomada* was defined as having “the dorsum of the pronotum rounded-carinate, slightly depressed medially, the scape of the male antenna globular and swollen, the apex of the hind tibiae with 4–6 widely spaced short acute spines.” Moalif (1979) revised the subgenus *Pachynomada* and his redefinition of the subgenus was based upon unique genitalic characters and the form of the hind basitarsus.

The morphological terminology used in this study generally follows that of Michener (1944) and Stephen, et al., (1969). The following is a list of abbreviations and new or uncommon morphological terminology used:

- acetabular carina (see Fig. 13); a lamellate projection at the upper base of the mandible, especially prominent in male *Nomada*.
- prelobar carina (see Fig. 18); connects posterior margin of pronotal ridge with anterior margin of pronotal lobe.
- paraocular carina; raised area running along interior margin of compound eye and crossing from base of eye to anterior mandibular articulation.

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Figures 1–19. Figures 1–10. Male antennal scape. Figure 1. *Bohartorum*. Figure 2. *Tepoztilan*. Figure 3. *Dreisbachelorum*. Figure 4. *Besseyi*. Figure 5. *Victrix*. Figure 6. *Asteris*. Figure 7. *Aztecorum*. Figure 8. *Utahensis*. Figure 9. *Zebrata*. Figure 10. *Vincta*. Figure 11. *Utahensis*, abdomen of female. Figure 12. *Vincta*, abdomen of female. Figure 13. *Nomada (Pachynomada)* sp., mandible, with acetabular carina. Figure 14. *Aztecorum*, labrum. Figure 15. *Suffossa*, labrum. Figure 16. *Victrix*, hind coxa. Figure 17. *Zebrata*, mesopleuron. Figure 18. *Nomada (Pachynomada)*, pronotum with prelobar carina. Figure 19. *Aztecorum*, scutellum and metanotum.

- hypoepimeral area; dorsal posterior quarter of mesopleuron. (see Michener, 1944, p. 305)
- IOD = interocellar distance;
- OOD = ocellocular distance;
- MLOD = mid-lateral ocellar distance;
- MOD = mid-ocellar diameter;
- MOOM = mid-ocellar occipital margin distance;
- IPS = interpunctural surface.

In the species descriptions the rims of the scutal punctures are referred to as “rounded” or “angulate.” An angulate puncture rim is one in which the scutal surface appears to have been shaved off, leaving the punctures incomplete. Tergum and sternum refer to the metasomal sclerites only. Thoracic sterna will be referred to as mesosternum or metasternum.

Subgenus Pachynomada Rodeck

Pachynomada Rodeck, 1945, Entomol. News 56:180.

Type species: *Nomada vincta* Say, original designation

Diagnosis.—Penis valve with conspicuous ventral subapical hook, eighth sternum elongated apically; occipital margin gently rounded, posterior basitarsus expanded medially (Fig. 44); posterior tibia with 4–8 apical bristles; minimum length of first flagellar segment longer than maximum length of second; propodeum lacking dorso-lateral angle behind spiracles; supraclypeal area distinctly protuberant; mandibles simple; female with paraocular carina.

Description.—Length 7.4–13.3 mm, forewing length 5.3–10.4 mm, hindwing length 4.1–8.1 mm; minimum length of first flagellar segment greater than maximum length of second; antennal scape in males often inflated to globose; pre-occipital ridge rounded, not reflexed or strongly angulate; supraclypeal area distinctly protruberant between antennal insertions, with a flattened median carina; margin of labrum sharply angulate; females with well developed paraocular carina; mandibular acetabular carina lamellate in males; mandibles lacking subapical tooth; head densely punctate with smooth shiny IPS (exceptions noted in species descriptions); Thorax: prelobar carina short, prominent; apex of pronotal ridge usually rounded, broadly depressed medially; scutum deeply, contiguously punctured, occasionally reticulate; rim of punctures frequently angulate, giving them a “shaved” appearance, IPS smooth and shiny; tegulae shallowly punctured with glassy surface; scutellum weakly to strongly bilobate, postero-medial region with distinctly microrugose IPS; propodeal disk rugose medio-apically and latero-apically, shagreened ventrally; sides of propodeum somewhat swollen posterior to spiracle (but not angulate), suprspiracular ridge undeveloped; mesopleuron densely, circularly punctured (sometimes reticulate), IPS glassy ventrally roughened dorsally, hypoepimeral area often distinctly protruding; procoxa often bearing a rudimentary posterior spine, usually showing as a sharp bump or angulation; hind tibial apex with a row of 4 to 8 thickened bristles; hind basitarsi distinctly widened medially, with curved anterior and posterior margins; forewing with 2 or 3 submarginal cells; sternum 8 of males with narrow, elongated distal process; penis valves with distinct ventral subapical projection; body sparsely clothed with moderately long pubescence; COLOR: Various combinations of black, yellow,

ferruginous, and rufo-ferruginous. Female differs from male as follows: Scape cylindrical; short, wide pseudopygidium present, anterior tarsal brushes absent; apex of sternum 8 with conspicuous lateral tufts of long inward curving hairs.

Most *Pachynomada* species fall within 3 distinct species groups, the members of which are quite similar morphologically, although they may differ greatly in coloration. Most of the species are related closely to *vincta*. Three species are assigned to monotypic species groups.

Vincta Group:

vincta Say, 1837; *suffossa* Cockerell, 1922;
aztecorum aztecorum Cockerell, 1903; *utahensis* n. sp.;
aztecorum pratensis Cockerell, 1919; *zebrata* Cresson, 1878;
saltillo n. sp.;

Bohartorum Group:

bohartorum n. sp.; *tepoztlan* n. sp.;

Vitticollis Group:

dreisbachorum n. sp.; *vitticollis* Cresson, 1878;

Asteris Group:

asteris Swenk, 1913;

Besseyi Group:

besseyi Swenk, 1913;

Victrix Group:

victrix Cockerell, 1911;

KEY TO THE SPECIES OF *Pachynomada*

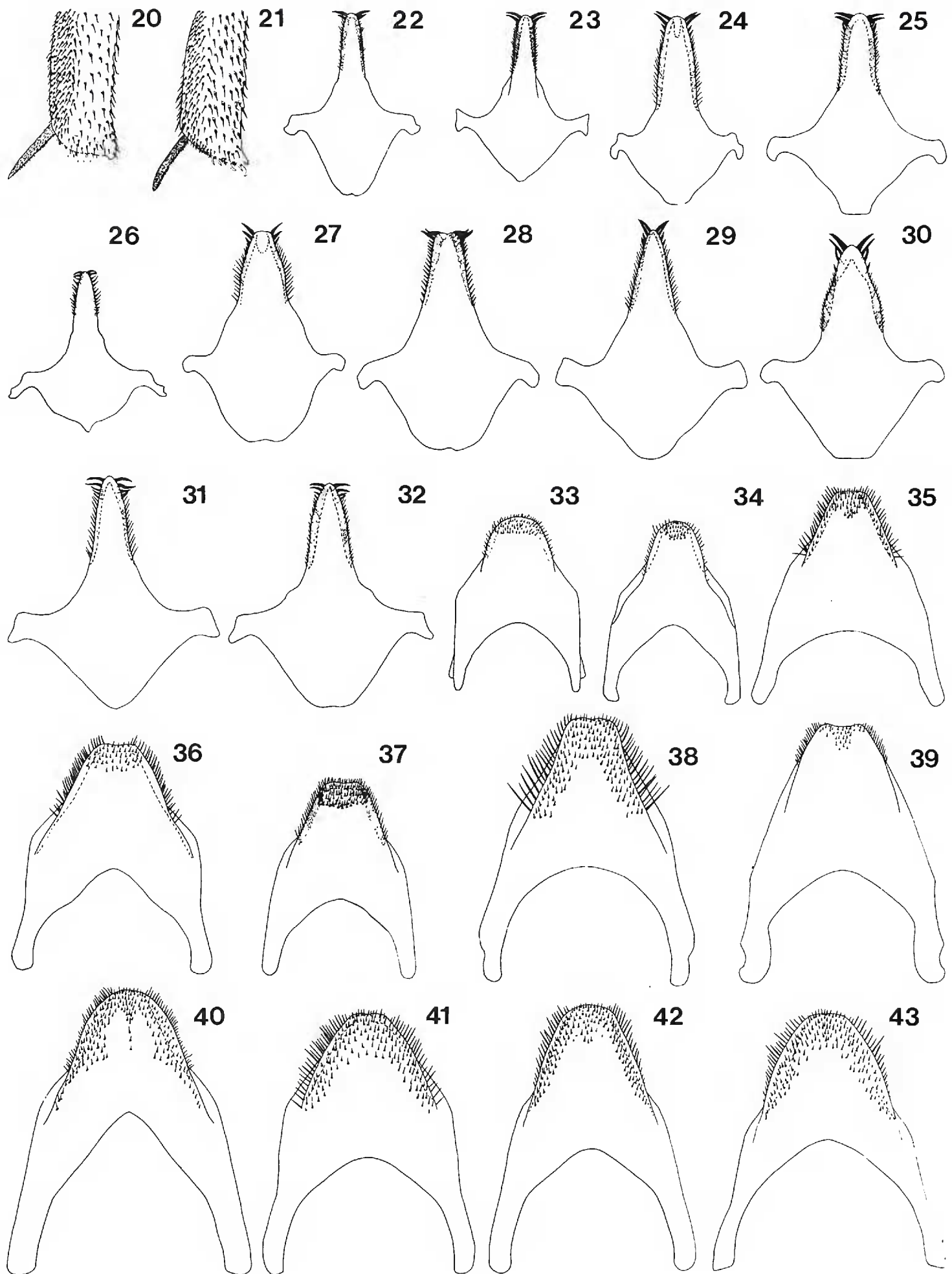
Males:

1. 2 submarginal cells in forewing 2
- 3 submarginal cells in forewing 3
2. hind coxa with a dorsal posterior carina extending almost $\frac{1}{2}$ the length of the coxa (Fig. 16) *victrix* Cockerell
- hind coxa not as above, antennal scape with hairs longer than $\frac{2}{3}$ length of scape
dreisbachorum n. sp.
3. propodeum appearing naked, pubescence little longer than the diameter of a puncture *besseyi* Swenk
- propodeum with long lateral pubescence 4
4. propodeum with extensive yellow or ferruginous lateral marks, covering most of propodeal sides 5
- sides of propodeum black, rarely with a small yellow posterior lateral mark, not much larger than spiracle 8
5. small bee (7.5 mm), entire body a uniform light brown color with greatly reduced ornamentation *tepoztlan* n. sp.
- larger bees (9.0 mm), or with bodies not a uniform light brown color and having extensive yellow maculations on thorax, head and abdomen 6
6. antennal scape globose or ovate (Fig. 9, 10) 7
- antennal scape not globose, somewhat swollen apically (Fig. 8) *utahensis* n. sp.

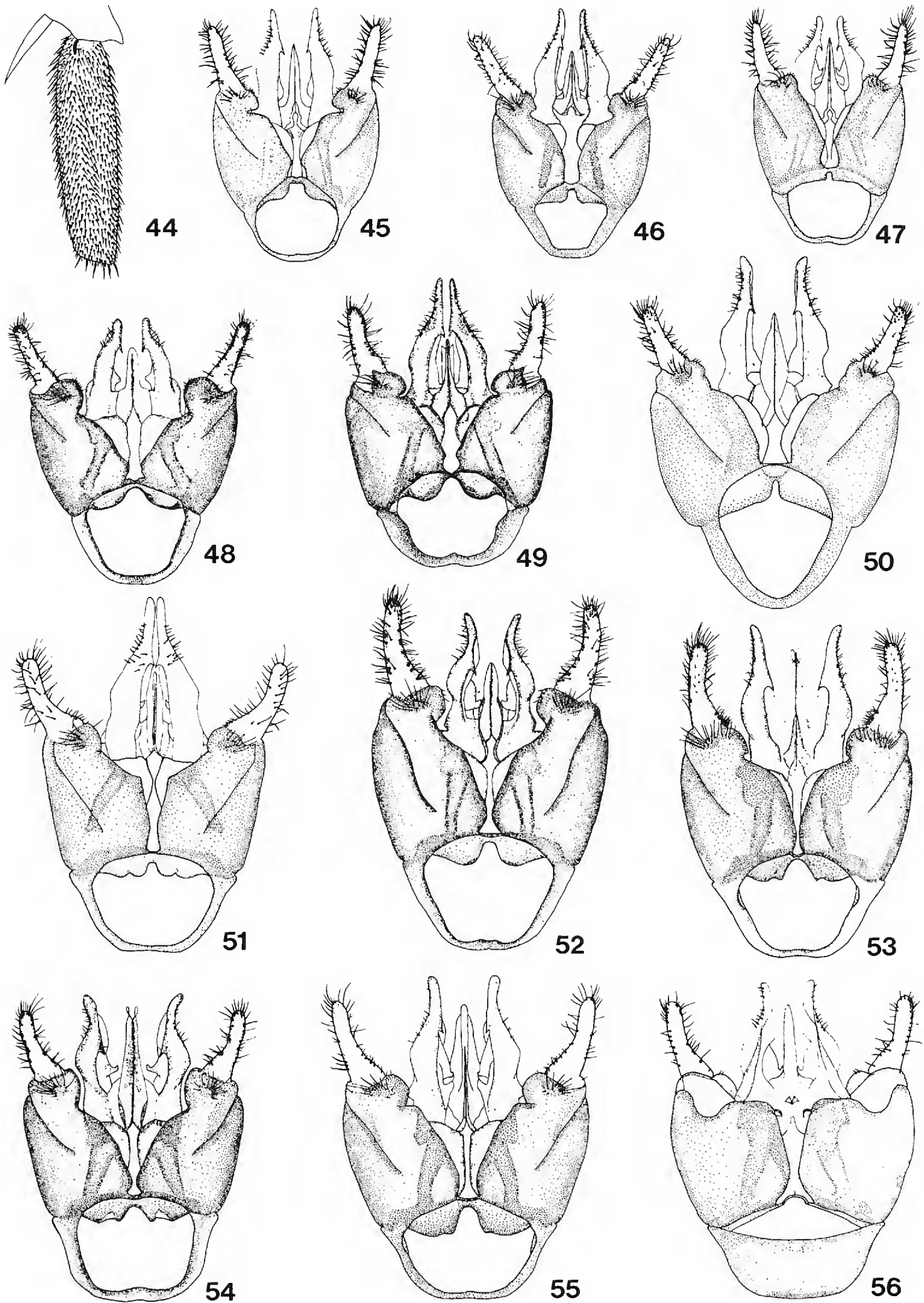
7. mesopleuron with a longitudinal yellow band extending from anterior margin to posterior margin, narrowed medially (Fig. 17) *zebrata* Cresson
 — mesopleuron without a complete longitudinal yellow band, usually only an anterior triangular patch *vincta* Say
8. antennal scape globose 9
 — antennal scape narrow apically *bohartorum* n. sp.
9. antennal scape uniformly ferruginous, scutellum cream colored, without median black area *asteris* Swenk
 — antennal scape black, or if ferruginous, with dark posterior markings, scutellum with median black area 10
10. labrum with broad impunctate median welt and basal lateral welts, curving downward from center to apex (Fig. 14) 11
 — labrum without impunctate lateral welts, entire apex strongly upturned (Fig. 15) *suffossa* Cockerell
11. yellow bands on abdominal terga narrow, at midpoint less than $\frac{1}{3}$ total length of tergum, legs usually black or with extensive dark areas . . *aztecorum aztecorum* Cockerell
 — yellow bands on abdominal terga wide, at midpoint more than $\frac{1}{2}$ total length of tergum, legs completely ferruginous *aztecorum pratensis* Cockerell

Females:

1. hind coxa with a dorsal, posterior carina extending almost $\frac{1}{2}$ length of coxa (Fig. 16), 2 submarginal cells in forewing *victrix* Cockerell
 — hind coxa not as above, 3 submarginal cells in forewing 2
2. abdominal terga with several complete transverse yellow or cream-colored bands 3
 — abdominal terga never with complete transverse yellow bands, body ferruginous *asteris* Swenk
3. propodeum appearing naked, pubescence not longer than the diameter of a puncture *besseyi* Swenk
 — propodeum with long lateral pubescence 4
4. propodeum with extensive yellow or ferruginous lateral markings 8
 — propodeum black, or with small yellow mark, not much larger than spiracular area 5
5. scutellum with yellow markings widely separated by dark areas, at least posteriorly, hind tibial bristles not flattened or curved apically (Fig. 19, 20) . . 6
 — scutellum with yellow markings not separated, hind tibia with 4 or 5 apical bristles, flattened, strongly curved (Fig. 21) *bohartorum* n. sp.
6. labrum with broad impunctate median and lateral welts, curving downwards at sides (Fig. 14) 7
 — labrum evenly punctate, may have impunctate median line, but not raised, apical margin with a strongly upcurved lip (Fig. 15) *suffossa* Cockerell
7. yellow bands on abdominal terga narrow, at midpoint less than $\frac{1}{3}$ length of tergum, legs usually black or with extensive dark areas . . *aztecorum aztecorum* Cockerell
 — yellow bands on abdominal terga wide, at midpoint more than $\frac{1}{2}$ length of tergum, legs completely ferruginous *aztecorum pratensis* Cockerell



Figures 20–43. Figure 20. *Vincta*, posterior tibial apex. Figure 21. *Bohartorum*, posterior tibial apex. Figures 22–32, sternum VIII of Male. Figure 22. *Bohartorum*. Figure 23. *Tepoztlan*. Figure 24. *Asteris*. Figure 25. *Besseyi*. Figure 26. *Victrix*. Figure 27. *Dreisbachorum*. Figure 28. *Aztecorum*. Figure 29. *Suffossa*. Figure 30. *zebrata*. Figure 31. *Utahensis*. Figure 32. *Vincta*. Figures 33–43, Sternum VII of Male. Figure 33. *Bohartorum*. Figure 34. *Tepoztlan*. Figure 35. *Asteris*. Figure 36. *Besseyi*. Figure 37. *Victrix*. Figure 38. *Dreisbachorum*. Figure 39. *Aztecorum*. Figure 40. *Suffossa*. Figure 41. *Utahensis*. Figure 42. *Zebrata*. Figure 43. *Vincta*.



Figures 44–56. Figure 44. *Vincta*, hind basitarsus. Figures 45–55. Male genital capsule (ventral view). Figure 45. *Bohartorum*. Figure 46. *Tepozilan*. Figure 47. *Victrix*. Figure 48. *Asteris*. Figure 49. *besseyi*. Figure 50. *dreisbachorum*. Figure 51. *Aztecorum*. Figure 52. *Suffossa*. Figure 53. *Utahensis*. Figure 54. *Zebrata*. Figure 55. *Vincta*. Figure 56. *Vincta*, genital capsule (dorsal view).

8. pronotum, mesopleuron, metapleuron, and propodeum almost entirely yellow
vitticollis Cresson
— thorax with extensive ferruginous or black areas 9
9. mesopleuron with a longitudinal yellow band from anterior to posterior border,
narrowed medially, (Fig. 17) *zebrata* Cresson
— mesopleuron with at most a small anterior yellow patch 10
10. sides of propodeum ferruginous, with a basal posterior yellow spot, not much
larger than spiracular area, maculations cream-colored *saltillo* n. sp.
— sides of propodeum with extensive yellow markings, maculations yellow . . . 11
11. tergum II with narrow median transverse band, extensive dark areas anteriorly
and posteriorly (Fig. 12) *vincta* Say
— tergum II with broad median transverse yellow band, almost no dark area
anteriorly (Fig. 11) *utahensis* n. sp.

DESCRIPTIONS OF THE SPECIES

Vincta Group:

Nomada vincta Say, 1837. Boston Jour. Nat. Hist. 1:401.

Nomada vincta heterochroa Cockerell, 1921. Amer. Mus. Novit. 24:1. NEW
SYNONYMY

Type.—Apparently lost.

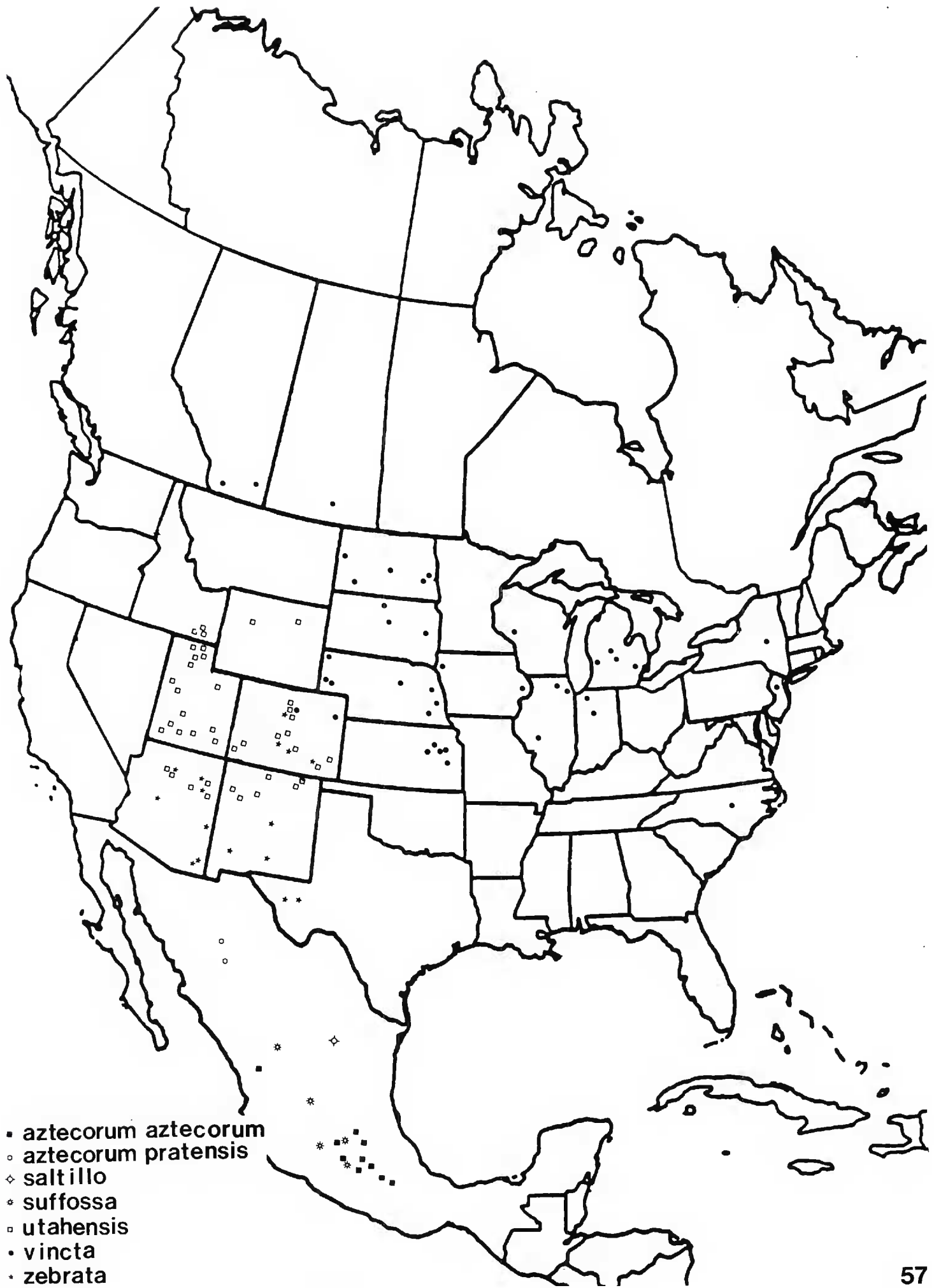
Diagnosis.—3 submarginal cells, complete transverse median bands on terga, sides of propodeum yellow with long pubescence, antennal scape obovate, mesopleuron lacking longitudinal yellow band (if present, greatly expanded anteriorly, reaching to pronotal lobe), punctation below mesopleural scrobe with interpunctural spaces up to half a puncture diameter.

Male.—Length 9.6–12.4 mm, forewing length 7.4–9.3 mm, hindwing length 5.8–6.8 mm; antennal scape globose, densely punctate, IPS shiny, slightly roughened; IOD = OOD = MOOM, MLOD = MOD; labrum densely punctate, with impunctate medio-apical strip produced into a weak beak; prelobar carina thickened, pronotal ridge rounded anteriorly; scutum deeply, contiguously punctured with puncture rims angulate, IPS shiny; scutellum depressed medially; metanotum with shiny roughened IPS; propodeal disk moderately rugose dorso-medially, remainder shagreened; propodeum clothed with long hairs (0.3 mm); tegulae densely, shallowly punctate, glassy IPS; metapleuron with lower half smooth, moderately punctate; procoxal spine rudiment reduced to slight bump; hind tibial apex with 5 evenly spaced ferruginous bristles; forewing with 3 submarginal cells; COLOR: antennal scape ferruginous, blending to light yellow, flagellum light ferruginous, darker apically; supra-clypeal area, clypeus, sides of face extending to apex of compound eyes, basal two-thirds of mandibles, malar space, gena, ring behind compound eyes, pronotal ridge and lobes, tegulae, axillary sclerites (in part), scutellum, metanotum, sides of propodeum, triangular anterior mesopleural patch, apex of fore- and mid-coxae, hind coxae, remainder of legs, median transverse band on abdominal terga, spot on first sternum, large transverse bands on remaining sterna, light yellow; remainder of body fuscous to black.

Females.—Length 8.1–11.5 mm, forewing length 6.5–9.3 mm, hindwing length 5.2–7.3 mm; similar to males except: antennal scape not inflated, sparsely punctate, with shiny, shagreened IPS; markings on face usually ferruginous, transverse median yellow bands on abdominal terga narrower.

Discussion.—*Nomada vincta* is the most common and widespread *Pachynomada* species. *Nomada vincta heterochroa* is based upon some unusually colored specimens with the normally black markings being ferruginous. It occurs at the same locality as normal *vincta* which rules it out as a valid subspecies, it is therefore relegated to synonymy. The type series of *Nomada vincta* appears to be lost. However, the type locality of Indiana has only two possible species of *Pachynomada*, and *N. besseyi* is not likely to have been confused with *N. vincta*. Since there seem to be no doubts about the identity *Nomada vincta*, the requirements of the International Code of Zoological Nomenclature for the designation of a neotype (Article 75) are not met.

Specimens examined.—CANADA: ALBERTA: 4.8 km (3mi) SE Picture Butte, 1 ♂, 6–VIII–1978 *Helianthus petiolaris* (C. D. Michener) SMEK; Medicine Hat, 1 ♀, (J. R. Malloch), 1 ♀, 13–VIII–1939 (E. H. Strickland), 1 ♂, 1 ♀, 16–VIII–1924 (F. S. Carr), 4 ♂♂, 8 ♀♀, 23–VIII–1919 (Sladen), 1 ♀, 7–IX–1925 (F. S. Carr), 1 ♀, 7–VIII–1938 (E. H. Strickland), 1 ♀, 9–IX–1939, (J. L. Carr); MANITOBA: Aweme, 1 ♀, 14–IX–1924 (N. Criddle); U.S.A.: COLORADO: 1 ♀, (Snow) ANSP; 14.5 km (9 mi) S Wray, 1 ♀, 2–IX–1951 (Paul P. ?) USNM; Fort Collins, 1 ♂, 1 ♀, 12–IX–03 BBSL; Wray 40 0'N 102 10'W, 1130 m (3700'), 1 ♂, 17–19/VIII/1919 CAS, 2 ♀♀, 17–19/VIII/1919, 1 ♀, 17–19/VIII/1919 Boul, 1 ♀, 17–19/VIII/1919 BBSL, 1 ♂, 1 ♀, 17–19/VIII/1919 USNM; ILLINOIS: Algonquin, 1 ♀, 13–IX–1894; Chicago 1 ♀, (A. L. Melander); Macoupin Co., Carlinville, (Charles Robertson), 1 ♀, 2–IX–1895 *Helianthus grosseserratus*, 5 ♀♀, 21–IX–1895 *Aster ericoides villosus*, 1 ♀, 5–IX–1895 *Helianthus grosseserratus*, 1 ♀, 9–IX–1895 *Helianthus grosseserratus*, 1 ♂; INDIANA: Lafayette, 1 ♂, 1 ♀, (Geo. G. Ainslie); Plymouth, 1 ♀, 4–IX–1917 (M. R. Smith); IOWA: Clarence, 1 ♀, 3–IX–1953 *Helianthus* (N. F. Stage); Sioux City, 1 ♂, 1–IX–1922 *Solidago* (C. N. Ainslie), 1 ♂, 5–IX–1927 (C. N. Ainslie), 1 ♂, 3 ♀♀, 8–IX–1920 (C. N. Ainslie); KANSAS: 2 ♂♂, 2589.5, 2589.4; Manhattan, (O. A. Stevens), 1 ♀, 24–VIII–1908 *Helianthus tuberosus*, 2 ♂♂, 25–VIII–1908 *Helianthus tuberosus*; Marysville, 1 ♀, 12–IX–1920 *Heliopsis scabra* (Edna M. Stevens); Topeka, 1 ♀, –IX– (J. E. Taylor); Clay Co., 1 ♂; Douglas Co., 2 ♂♂, 1 ♀, 25–VIII–1949 *Silphium perfoliatum*, (Michener, Beamer); MINNESOTA: Detroit, 1 ♀, 25–VIII–1913 *Aster sagittifolius* (O. A. Stevens); Hastings, 1 ♂, 26–VIII–1928, 3 ♂♂, 28–VIII–1928, 1 ♀, 30–VIII–1928 (H. A. Scullen); Lake Park, 1 ♀, 22–VIII–1911 *Rudbeckia laciniata* (C. H. Waldron); Miesville, 1 ♀, 4–IX–1951 *Helianthus maximiliani* (Roland Fischer); Stanton, 1 ♀, 28–IX–1957 *Helianthus maximiliani* (Roland L. Fischer) Mich; U. Farm, 1 ♀, 2–IX–1951 *Grindelia squarrosa* (Roland L. Fischer) Mich; MONTANA: 2 ♂♂, 1 +, ANSP; Huntley, 1 ♂, 16–VIII–1916; NORTH CAROLINA: Black Mountains, 1 ♂, 1 ♀, 1911; NORTH DAKOTA: Bismarck, 1 ♀, 12–IX–1920 *Helianthus tuberosus* (O. A. Stevens) Boul, 1 ♀, 23–VIII–1946 (Richard L. Post); Fargo, (O. A. Stevens), 1 ♂, 10–VIII–1912 *Grindelia squarrosa* NEBR, 2 ♂♂, 12–VIII–1910 *Grindelia squarrosa*, 1 ♂, 13–VIII–1910 *Solidago serotina*, 1 ♀, 13–VIII–1911 *Helianthus* (cult.), 2 ♂♂, 17–VIII–1911 *Grindelia squarrosa*, 3 ♂♂, 17–VIII–1911 *Grindelia squarrosa*, 2 ♀♀, 18–IX–1915 *Helianthus tuberosus*, 1 ♂, 18–VIII–1912 *Helianthus maximiliani*, 1 ♂♂, 29–VIII–1917 *Helianthus maximiliani* Boul, 1 ♀, 4–VIII–1911 *Helianthus* (cult.), 2 ♀♀, 8–IX–1913 *Helianthus tuberosus*, 1 ♂, 8–VIII–1920 *Sonchus arvensis*, Boul; Mandan, 1 ♀, 11–IX–1920 *Helianthus tuberosus* (O. A. Stevens); Mott, 1 ♂, 20–VIII–1914 *Solidago rigida* (J. R. Campbell) NEBR; Schafer, 1 ♀, 5–IX–1914 *Grindelia squarrosa* (O. A. Stevens) NEBR; Sheldon, (O. A. Stevens) 1 ♂, 10–VIII–1969 *Helianthus petiolaris* AMNH, 1 ♀, 20–VIII–1949



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Figure 57. Distribution of *Pachynomada* species of the *vincta* group.

Helianthus petiolaris; Williston, (O. A. Stevens), 1 ♂, 15-VIII-1915 *Grindelia squarrosa* Boul, 1 ♂, 15-VIII-1915 *Grindelia squarrosa* AMNH; Ransom Co., 11.3 km (7 mi) SE Sheldon, 1 ♂, 19-VIII-1980 (J. R. Powers); NEBRASKA: Lincoln, 1 ♂, NEBR, 1 ♀, -IX-, 1 ♀, 18-IX-1903 *Grindelia* (M. H. Swenk), 1 ♀, 29-VIII-1936 (R. E. Hill); Mitchell, 1 ♂, 12-VIII-1915 (E. M. Partridge) NEBR, 2 ♀ ♀, 12-VIII-1916 (C. E. Mickel), 1 ♀, 24-VIII-1916 (R. W. Dawson), 1 ♀, 25-VIII-1916 (R. W. Dawson), 1 ♀, 29-VII-1913 (L. M. Gates), 1 ♀, 5-IX-1916 (R. W. Dawson), 1 ♀, 8-VIII-1913 *Helianthus annuus* (L. M. Gates), 1 ♂, 9-VIII-1915 (E. M. Partridge) NEBR; Morrill, 1 ♂, 11-VIII-1930 (D. B. Whelan) Boul; Omaha, (L. T. Williams), 1 ♂, 13-VIII-19—, 1 ♂, 1 ♀, 16-VIII-1913, 1 ♀, 16-VIII-1913 *Helianthus*, 1 ♂, 17-VIII-1913, 1 ♀, 2-IX-1913, 1 ♂, 4 ♀ ♀, 22-VIII-1913 *Helianthus*, 1 ♀, 23-VIII-1913, 1 ♀, 29-VIII-1913; West Point, 2 ♂ ♂, 6 ♀ ♀, -VIII-1887, 1 ♂, 12-IX-1903 *Solidago* (J. C. Crawford), 1 ♀, 2-IX-1900 *Helianthus*, 1 ♂, 4-IX-1903 *Helianthus* (J. C. Crawford), 1 ♀, 27-VIII-1903 (J. C. Crawford); Sioux Co., Glen, 1 ♂, 12-VIII-1906 *Helianthus* (H. S. Smith), 1 ♀, 20-VIII-1906 *Cleome* (H. S. Smith); Holt Co., Atkinson, 1 ♂, 30-VIII-1954 *Helianthus petiolaris* (L. W. Quate); Lancaster Co., Lincoln, 1 ♂, 1 ♀, -VIII-, 1 ♀, 11-IX-1954 jap beetle trap, 1 ♀, 11-IX-1954, 1 ♀, 17-IX-1917 *Grindelia squarrosa* (L. Bruner), 1 ♀, 20-IX-1915 (C. E. Mickel), 1 ♂, 30-VIII-1964 *Helianthus* (D. W. Ribble), 1 ♀, 4-IX-1904 *Solidago*, 1 ♀, 6-IX-1964 *Helianthus* (D. W. Ribble), 3 ♀ ♀, 7-IX-1964 *Helianthus* (D. W. Ribble); NEW JERSEY: Ramsey, 2 ♂ ♂, 1 +, 23-VIII-1921, 1 ♀, 3-IX-1917, 1 ♀, 6-IX-1917; NEW YORK: Cooperstown, 1 ♀, 30-VII-1927 (L. Lacey); SOUTH DAKOTA: 4.8 km (3 mi) W. Dallas, 1 ♂, 15-VIII-1958 *Helianthus annuus* (W. E. LaBerge) NEBR; Brookings, (H. C. Severin), 1 ♂, 23-VIII-1933 LACM, 5 ♀ ♀, 25-VIII-1921 USNM; Dallas, 2 ♀ ♀, 15-VIII-1958 *Helianthus annuus* (W. E. LaBerge); Gettysburg, 1 ♂, 12-VIII-1924 USNM; Wobridge, 1 ♂, 15-VIII-1924 USNM; WISCONSIN: Buffalo Co., Fountain City, 1 ♂, 12-17/VIII/1910;

***Nomada (Pachynomada) aztecorum aztecorum* Cockerell**

Nomada aztecorum Cockerell, 1903. Ann. Mag. Nat. Hist. 12:211. Lectotype, female: "Amecameca, Mex. IX, Type No. 10145." type Depository, Academy of Natural Sciences of Philadelphia.

Diagnosis.—3 submarginal cells, propodeum black (at most with a small posterior basal yellow spot) with long pubescence, terga with complete yellow transverse bands, antennal scape globose, mesopleural punctation separated by half a puncture diameter or more in posterior ventral area.

Males.—Length 8.7–13.3 mm, forewing length 7.0–10.1 mm, hindwing length 5.8–7.7 mm; antennal scape globose; acetabular carina strongly lamellate, otherwise similar to females.

Females.—Length 9.6–12.3 mm, forewing length 8.7–9.8 mm, hindwing length 6.4–7.8 mm; antennal scape sparsely punctate basally, dense apically, IPS roughened basally, smooth apically; face densely, deeply punctured, many deformed, IPS roughened, rather dull over most of head; IOD < OOD < MOOM, MLOD < MOD; labrum with strongly carinate margin, surface highly polished and deeply punctate laterally, impunctate welt basolaterally and medially, protruding into a beak; prelobar carina strong; pronotal ridge rounded anteriorly, broadly depressed medially, impunctate medially; scutum contiguously punctured with much

deformation; scutellum elevated, flattened dorsally, slightly depressed medially, postero-medial IPS coarsely roughened; propodeal sides deeply punctured, hairs 0.4 mm long; mesopleuron densely punctured (0.06 mm diameter), with dull, coarsely roughened IPS; metapleuron with ventral half shiny, rugose; procoxal spine rudiments short; hind tibial apex with 6 staggered bristles, pygidium with impunctate median welt; forewing with three submarginal cells: COLOR: scape, pedicel, first flagellar segment ferruginous anteriorly, remainder of antennae brown; apical half of clypeus, sides of face to about top of scape, labrum, mandibles, malar space, pronotal ridge and lobes, two spots on scutellum, metanotum, anterior rectangle on mesopleuron, posterior lateral spot near propodeal spiracle, apex of fore- and mid coxae, hind coxae, attenuated transverse median band on tergum 1–5, spot on sternum 1, band of sternum 2, yellow; remainder of body fuscous to black.

Discussion.—*Nomada aztecorum* is a southern *Pachynomada*, to date found only in Mexico. The northern specimens from Chihuahua have more extensive ferruginous markings, the transverse yellow bands on the abdomen are much wider, and the body is more robust than the typical form. Moalif (1979) commented that this was a highly variable species and proposed synonymy of *aztecorum pratensis* and *suffossa* with *aztecorum*. *Nomada suffossa* is a distinct species, with a differently shaped labrum and denser mesopleural punctation. The elimination of specimens of *suffossa* which were confused with *aztecorum* leaves very little intergradation in coloration of *aztecorum aztecorum* and *aztecorum pratensis*. *Nomada aztecorum pratensis* is therefore retained as a distinct subspecies.

Specimens examined.—MEXICO: Atlacomulco, 2600 m (8550'), 1 ♂, 30–VIII–1963 (Scullen & Bolinger); HIDALGO: 38.0 km (23.6 mi) NW Zacatlan, 2030 m (6650'), (U. Kans. Mex. Exped.) SMEK, 2 ♂♂, 1 + 22–VIII–1962; Tepeapulco, 1 ♀, 18–IX–1974 (W. Hanson, G. Bohart) BBSL; MEXICO: 29.0 km (18 mi) S. of Mexico City, 2800 m (9200'), (H. A. Scullen), 2 ♂♂, 10–IX–1957 ORSU, 3 ♂♂, 10–IX–1957 ORSU, 3 ♂♂, 10–IX–1957, 1 ♂, 1 ♀, 2750 m (9000'), 14–IX–1957, 3 ♂♂, 14–IX–1957 ORSU; 64.4 km (40 mi) E. Mexico City, 3010 m (9900'), (H. A. Scullen), 1 ♂, 7–IX–1957 ORSU, 3 ♂♂, 7–IX–1957; 0.6 km W Bosencheve, 2514 m., (C. D. George, R. R. Snelling) LACM, 1 ♂, 14–IX–1976 *Simsia amplexicaulis*, 3 ♂♂, 2 ♀♀, 14–IX–1976; MORELOS: Tres Cumbres, 1 ♂, 20–IX–1938 (L. J. Lipovsky) SMEK; NAYARIT: Santa Teresa, 2073 m., 2 ♀♀, 22–25/X–1979 (D. E. & J. A. Breedlove); PUEBLA: 6.9 km (4.3) mi W. Huauchinango, 1720 m (5650'), 1 ♂, 21–VIII–1962 (U. Kans. Mex. Exped.); 64.4 km (40 mi) W of Puebla, 2800 m (9200') (H. A. Scullen), 3 ♂♂, 1 + 7–IX–1957; 9.7 km (6 mi) NW Zacatlan, 2440 m (8000'), 1 ♂, 22–VIII–1962 *Heterotheca* (Ordway & Roberts);

Nomada (Pachynomada) aztecorum pratensis Cockerell

Nomada aztecorum pratensis Cockerell, 1919. Proc. U.S. Natl. Mus., 55:180

Holotype Female.—“Meadow Vy, Mex. Collector Townsend, Type No. 20213”. Type Depository, United States National Museum.

Males.—Length 9.8–12.9 mm, forewing length 8.4–9.3 mm, hindwing length 6.4–7.6 mm; differs from nominate subspecies by much thicker yellow bands on abdominal terga, legs almost completely ferruginous, antennal scape more ferruginous, mesopleural mark ranging from a spot to a longitudinal band;



Figure 58. Distribution of *Pachynomada* species exclusive of the *vincta* group.

Females.—Length 11.0–11.9 mm, forewing length 8.6–9.8 mm, hindwing length 6.7–7.7 mm; differs from males by supraclypeal area ferruginous, mesopleural mark forming a longitudinal band, mesopleuron ferruginous in the type.

Specimens examined.—MEXICO: Meadow Vy., 3 ♂♂, (Townsend) USNM; CHIHUAHUA: 6.4 km (4 mi) S. Santo Tomas, 1 ♂, 22–VIII–1950 (Ray F. Smith); Creel, (Sears, Gardner, Glaser) 1 ♂, 1 ♀, 24–VIII–1969, 1 ♀, 8–IX–1969;

Nomada (Pachynomada) saltillo Broemeling **NEW SPECIES**

Holotype Female.—“Mexico, Coah. Saltillo, 32 mi S., VIII–23–1957, D. Spencer, R., J. & A. Ryckman Collectors.” Type Depository, Natural History Museum of Los Angeles County.

Diagnosis.—3 submarginal cells, abdomen with transverse medial bands, sides of propodeum ferruginous (with small cream-colored posterior basal spot) with long pubescence, lacking longitudinal mesopleural band.

Males.—Unknown

Females.—Length 10.8 mm, forewing length 9.9 mm, hindwing length 7.6 mm; antennal scape sparsely, shallowly punctate, shiny shagreened IPS; IOD = OOD = MOOM, MLOD < MOD; raised impunctate hump behind mid-ocellus; head densely punctate, polished IPS; sides of labrum slightly downturned, (not as sharply as *aztecorum*), broad, impunctate median welt, apex upturned, forming a wedge; prelobar carina thick, rounded; pronotal ridge rounded anteriorly, broadly shallowly depressed medially, impunctate at very middle; scutum densely, deeply punctured, interpunctural spaces reduced to knife-like ridge; tegulae densely, shallowly punctured, IPS glassy; scutellum moderately depressed medially; metanotum somewhat flattened medially; mesopleuron with interpunctural spaces reduced to thin sharpened ridges; metapleuron shiny, punctate ventrally; pro-coxal spine rudiment virtually absent; hind tibial apex with six ferruginous, evenly spaced, straight bristles; forewing with 3 submarginal cells, apex darkly infuscated: COLOR: lower sides of face, malar space, pronotal ridge and lobes, most of tegulae, lobes of scutellum, metanotum, small postero-baso-lateral propodeal spots, anterior spot on mesopleuron, apices of mid- and hind-coxae, broken transverse median band on tergum 1, complete but very narrow medially on tergum 2–4, extensive band on tergum 5, broken band on sternum 3, emarginate band on sternum 4, creamy white; head except vertex and area directly above antennal insertions, antennae, scutum (except posterior medial patch), mesopleuron and mesosternum, sides of propodeum, legs, terga and abdominal sterna, rufo-ferruginous; remainder fuscous to black.

Discussion.—*Nomada saltillo* is similar morphologically to *aztecorum* and *suffossa*, but body coloration and conformation of the labrum are different. Extensive collecting might show this species to be merely an aberrant specimen. *Nomada saltillo* is also similar to *zebrata*, but has paler maculations, lacks a mesopleural band and has a more robust form.

Specimens examined.—This species is known only from the type.

Nomada (Pachynomada) suffossa Cockerell

Nomada (Holonomada) suffossa Cockerell, 1922. Proc. U.S. Natl. Mus. 60:16.

Holotype Male.—“Mex 2320, Collection C. F. Baker; Type No. 24893.” Type Depository, United States National Museum.

Diagnosis.—3 submarginal cells, terga with yellow transverse medial bands, sides of propodeum black (rarely with small posterior basal spot) with long pubescence, antennal scape globose, labrum concave in cross-section, strongly recurved at apex, evenly punctate.

Males.—Length 10.4–12.1 mm, forewing length 8.9–10.4 mm, hindwing length 6.9–7.9 mm; antennal scape globose, sparsely punctate anteriorly, more dense along outside margin, IPS polished; IOD = OOD < MOOM, MLOD < MOD; face densely punctate, glassy IPS, raised impunctate bump behind mid-ocellus; labrum bordered by a carina, broad impunctate median welt, much wider apically, apex of labrum strongly bent upward along entire apical margin; prelobar carina thickened; pronotal ridge rounded anteriorly; scutum deeply, densely, contiguously punctured with sharp, narrow interpunctural spaces; scutellum slightly depressed medially; metanotum not flattened medially; sides of propodeum deeply contiguously punctured, interpunctural spaces very narrow, clothed with long hairs (0.3 mm); mesopleuron deeply contiguously punctured, interpunctural spaces often reduced to a sharp ridge, IPS smooth, shiny ventrally, roughened dorsally; hypoepimeral prominence distinct; metapleuron ventrally smooth, shiny, sparsely punctate; procoxal spine rudiment absent; hind tibial apex with six straight, pale ferruginous bristles; forewing with 3 submarginal cells: COLOR: posterior of scape and first flagellar segment light ferruginous, anterior scape dark brown; two spots on supraclypeal area, sides of face halfway up to antennal socket (higher along compound eye), labrum, basal two-thirds of mandibles, pronotal ridge and lobes, outer two-thirds of tegulae, lobes of scutellum, metanotum, anterior mesopleural spot, apices of mid- and hind coxae, median lateral marks on tergum 1, transverse median band (narrowed medially) on tergum 2–4, slightly narrowed on tergum 5, lateral medial patches on sternum 3 and 4, yellow: remainder of body dark brown to black.

Females.—Length 10.9–11.9 mm, forewing length 9.3–10.0 mm, hindwing length 7.4–8.1 mm; differs from male in narrower abdominal banding, facial markings more ferruginous.

Discussion.—See *Nomada aztecorum*.

Specimens examined.—MEXICO: DURANGO: Hidalgo, 1 ♂, 24–IX–1938 (L. J. Lipovsky) SMEK; JALISCO: 9.7 km (6 mi) S. Ojuelos, 2130 m (6975'), (U. Kans. Mex. Exped.), SMEK, 2 ♂♂, 25–VII–1962 *Heterotheca*; Mexico: 35.4 km (22 mi) N. Toluca, 2590 m (8500'), 3 ♂♂, 17–VIII–1954 (U. Kans. Mex. Exped.) SMEK; 12.9 km (8 mi) N. Atlacomulco, 2520 m (8250'), 1 ♀, 30–VIII–1963 (Scullen & Bolinger), ORSU; Atlacomulco, 2610 m (8550'), 3 ♂♂, 1 + 30–VIII–1963 (Scullen & Bolinger) ORSU; MICHOACAN: 6.4 km (4 mi) N. Morelia, 1830 m (6000'), 1 ♂, 28–VII–1962 (U. Kans. Mex. Exped.) SMEK;

Nomada (Pachynomada) utahensis Moalif NEW SPECIES

Holotype Male, Allotype Female.—Pinned with holotype “Topaz Ut. VIII–12–1949 Geo. E. Bohart, *Helianthus annuus*.” Type Depository, United States National Museum.

Diagnosis.—3 sub-marginal cells, terga with yellow transverse median bands, sides of propodeum yellow, with long pubescence, antennal scape not globose (widest at apex or just below), yellow mesopleural band if complete (rare) is expanded upwards to pronotal lobe, mesopleural interpunctural spaces below scrobal suture reduced to thin lines.

Male.—Length 9.3–12.6 mm, forewing length 7.3–8.9 mm, hindwing length 5.8–7.8 mm; antennal scape widest at apex, shallowly punctured, IPS smooth and shiny; OOD < IOD < MOOM, MLOD = MOD; labrum produced into a beak apically; acetabular carina elongate, lamellate; prelobar carina thin, prominent; pronotal ridge rounded apically; scutal punctures with sharply angulate rims; tegulae evenly punctate, IPS polished; scutellum faintly depressed medially; metapleuron with ventral half punctate, shiny; procoxal spine rudiment present; hind tibial apex with 5 light ferruginous bristles; forewing with 3 submarginal cells; COLOR: scape, supraclypeal area, sides of face, clypeus, complete ring around compound eyes, labrum, basal two-thirds of mandibles, pronotal ridge and lobes, tegulae, sides of scutum and two parasagittal stripes (absent in northern specimens), axillae, scutellum, metanotum, sides of propodeum, anterior mesopleuron extending up to subaxillary sclerites, posteriorly attenuated longitudinal band, hypoepimeral prominence, posterior meso- and metasternum, coxae (except basal area), majority of legs, terga (except dark apical bands), sterna (except clear apical impunctate bands and dark brown base of sternum I), bright yellow; remainder of body black.

Female.—Length 9.6–11.5 mm, forewing length 8.0–9.9 mm, hindwing length 6.2–7.6 mm; differs from male in scape not inflated, facial markings frequently ferruginous, dark areas of integument commonly ferruginous, not black as in males, legs somewhat darker than males.

Discussion.—This species is very close to *vincta*. It is possible that it represents a western form of that species, but the authors feel sufficient structural differences justify its specific status. The shape of the antennal scape in male *Pachynomada* can vary and *utahensis* with unusually swollen scapes can be difficult to distinguish from *vincta* with unusually narrow scapes. The females of these two species can be difficult to separate, but the tergal banding and the dark color of the thorax of *vincta* females makes identification possible.

Paratypes.—UTAH: Cache Co., Cornish, 600, 7–VIII–1978 4 ♂♂, 15–VIII–1978, 3 ♂♂, 1–IX–1978, 7 ♀♀, 9–IX–1978, 9–IX–1978, 4 ♀♀, 15–IX–1978, *Helianthus annuus* (A. S. Moalif), 1 ♂, 27–VIII–1967 (G. F. Knowlton); Logan 1 ♂, 17–VIII–1950 *Helianthus annuus* (John V. Bruce); Newton, 1 ♀, 13–VIII–1958 *Helianthus annuus* (William P. Nye); Duchene Co., Myton, 2 ♂♂, 3–IX–1964 *Helianthus annuus* (G. E. Bohart); Millard Co., Delta, 2 ♂♂, 20–VIII–1963 *Helianthus annuus* (G. F. Knowlton), 1 ♂, 15–VIII–1952 *Helianthus annuus* (G. E. Bohart E. A. Cross); Work Farm, N. of Delta, 2 ♂♂, 6–VIII–1947 *Helianthus annuus* (G. E. Bohart); Topaz, 1 ♂, 1 ♀, 12–VIII–1949 *Helianthus annuus* (Geo. E. Bohart); IDAHO: Bingham co., Aberdeen, 1 ♂, 17–VIII–1954 (A. R. Gittins); Franklin Co., Weston, 1 ♂, 22–VIII–1967 *Helianthus annuus* (G. F. Knowlton);

Additional specimens examined.—U.S.A.: ARIZONA: 8.1 km (5 mi) E. Fort Apache, 3 ♀♀, 28–VIII–1964 (M. E. Irwin), 2 ♀♀, 28–VIII–1964 (P. A. Rauch), 2 ♀♀, 28–VIII–1964 (E. I. Schlinger); Apache Co., 36.5 km (22.7 mi) S. Sanders, 1 ♂, 1 ♀ 26–VIII–1986 *Helianthus* sp. (R. R. Snelling) LACM; 24.2 km (15 mi) N. alpine 2320 m (7600') 1 ♀, 23–VIII–1986 *Helianthus* sp. (R. R. Snelling) LACM; Coconino Co., Flagstaff, 2 ♂♂, 7–9/VIII–1959 (K. V. Krombein) USNM, 1 ♀, 12–IX–1951 (J. G. Rozen), 2 ♀♀, 21–VIII–1939 (E. C. VanDyke), 1 ♂, 4–VIII–1934 (E. L. Bell); Snobowl, 24.2 km (15 mi) NW Flagstaff, 1 ♀, 12–VIII–1950 (Cohn, Boone, Cazier); COLORADO: 1 ♂, (C. F. Baker) BBSL; 1 ♀, (W. H. Ashmead) USNM; 1 ♀, ANSP; 4.8 km (3 mi) E Cortez, (U. N. Lanham), *Helianthus*, 6 ♂♂,

14-VIII-1976, 9 ♀♀, 14-VIII-1976, 5 ♂♂, 15-VIII-1976, 2 ♀♀, 15-VIII-1976; Boulder, 1 ♀, *Heliopsis* (W. P. Cockerell), 1 ♀, 15-VIII-*Helianthus coronatus*-x (Cockerell) Boul, 1 ♀, 2-VII-1929 (C. S. Williams) Boul, 1 ♀, 25-VIII-21 *Lepadenia marginata* (L. O. Jackson), 1 ♀, 1650 m (5400') 27-VIII-1979 (Kristi Neff) Boul, 1 ♂, 3-VIII-1927 (E. C. Nelson), 1 ♀, 1650 m (5400') 5-IX-1976 *Grindelia* (P. Robinson) Boul 12:30-13:45 p.m.; Canfield, 2 ♂♂, 15-VIII-1922; Denver, 1 ♀, -VII-29 Boul, 1 ♂, -VII-1929; Fort Collins, 1 ♂, 11-VIII-1974, 1 ♂, 23-31/VIII-1974, 1 ♀, 23-31/VIII-1974, 1 ♀, 23-31/VIII-1974 Ft. C, 1 ♀, 25-VIII-1975 Ft. C, 1 ♂, 26-VIII-1973, 1 ♀, 5-IX-1973 Ft. C (all H. E. Evans), 1 ♀, 5-VIII-99 USNM, 1 ♀, 12-VIII-00 USNM; J. Martin Dam, Hasty, 1 ♀, 22-VIII-1960 (R., K. Dreisbach); Pikes Peak, 2440 m (8000'), 2 ♂♂, -VIII-1932 (Lee Jeppson) BYU; Pingree Park, 1 ♀, (C. Lynn Hayward) BBSL; Pueblo, 1 ♀, 23-VIII-1931 (H. G. Rodeck) BBSL; Rock Creek vic. Colorado Springs, 1 ♂, 19-VIII-1937; Boulder Co., 2 ♂♂, 14-VIII-1925 (chas. H. Hicks) Boul; Fremont Co., 9.7 km (6 mi) NE Florence, 1 ♀, 11-VIII-1964 (J. G., B. L., K. C. Rozen); Larimer Co., 3.2 km (2 mi) E. Wellington, 2 ♀♀, 29-VIII-1976 *Helianthus* (C. Lanham) Boul; Las Animas Co., Kim 51.7 km (32.1 mi) SW, 1 ♀, 22-VIII-1967 (R. R. Snelling) BBSL; Montezuma Co., 4.8 km (3 mi) W Arriola, 1830 m (6000'), 1 ♀, -IX-1975 (T. Marquardt) Malaise Trap; Pueblo Co., 16.1 km (10 mi) W. Pueblo, 1 ♀, 11-VIII-1964 (J. G., B. L., K. C. Rozen); IDAHO: Oneida Co., 6.1 km (3.8 mi.) W. Holbrook Summit, 1 ♂, 26-VIII-1969 (G. F. Knowlton); Holbrook Summit, 1 ♂, 2-IX-1969 (G. F. Knowlton), 1 ♂, 26-VIII-1969 (G. F. Knowlton); Ireland Canyon, 1 ♂, 2-IX-1969 (G. F. Knowlton), 1 ♂, 2 ♀♀, 26-VIII-1969 (G. F. Knowlton); NEW MEXICO: 20.9 km (13 mi) W. of Chama, 1 ♂, 24-VIII-1947 (Hugo G. Rodeck); Beulah, 2440 m (8000'), 1 ♂ (Cockerell), 1 ♀, 17-VIII- (H. Skinner); Cimarron, 1 ♀, 17-22/VIII-1914 (W. R. Walton); Koehler, 1 ♀, 12-VIII-1914 (W. R. Walton); Raton, 1 ♂, 6-VIII-1952 (R. R. Dreisbach) Mich, 1 ♀, 6-VIII-1952 (R. R. Dreisbach); White Mtns. S. Fk. Eagle Creek, 2440 m (8000'), 1 ♀, 8-16 (Townsend); Mckinley Co., 30.6 km (19 mi) N. Gallup, 1 ♂, 14-VIII-1972 (J. G. Rozen, R. McGinley); Valencia Co., Cubero, 1 ♂, 18-VIII-1948 (C&P Vaurie) USNM; San Mateo, 2130 m (7000'), 4 ♀♀, 18-VIII-1962 (R&K Dreisbach) Mich, 5 ♂♂, 18-VIII-1962 (R&K. Dreisbach); UTAH: Bryce Canyon, 1 ♂, (Vasco M. Tanner); Hooper, 1 ♀, 17-IX-1937 (D. E. Hardy); Sandy, 1 ♂, 27-VIII-1947 (E. I. Taylor); Zion Pk Junction, 1 ♀, 9-VIII-1936 (M. B. Jackson) SMEK; Box Elder Co., Collinston, 1 ♂, 2-IX-1908 (E. S. G. Titus); Curlew Valley, 1 ♂, 1-IX-1970 (G. F. Knowlton, J. H. Judd); Hansel Mtns., 2 ♂♂, 28-VIII-1974 (G. F. Knowlton); Snowville, 3 ♂♂, 1-IX-1970 (G. F. Knowlton, J. H. Judd), 1 ♂, 16-VII-1953 (W. G. Firestone), 1 ♂, 26-VIII-1953 (W. G. Firestone); Cache Co., 6.4 km (4 mi) NW Logan, (D. K. Broemeling), 8 ♂♂, 10-VIII-1985 *Helianthus annuus*, 6 ♂♂, 10-VIII-1985, 2 ♂♂, 1 ♀, 22-VIII-1985, 3 ♂♂, 22-VIII-1985 *Helianthus annuus*; Cornish, 4 ♂♂, 20-VIII-1970 (G. E. Bohart) 1 ♂, 24-VIII-1973 (P. F. Torchio), 4 ♂♂, 27-VIII-1967 (G. F. Knowlton), 6 ♂♂, 7-IX-1968 *Helianthus* (C. D. Michener) SMEK; Hyrum Dam, (D. K. Broemeling), 1 ♀, 13-VIII-1985, 1 ♂, 9-VIII-1985 *Helianthus annuus*, 1 ♂, 9-VIII-1985, *Helianthus annuus*, 1 ♀, 9-VIII-1985; Logan, 1 ♂, 1 ♀, 18-VIII-1949 (G. E. Bohart), 1 ♂, 30-VIII-1955 (W. J. Hanson) SMEK; Petersboro, 3 ♂♂, 11-VIII-1947 *Helianthus annuus* (G. E. Bohart); Duchesne Co., Myton, *Helianthus annuus*, 1 ♂, 1 ♀, 3-IX-1964 (G. E. Bohart), 1 ♀, 8-VIII-1966 (Bohart, Cross); Emery Co., 0.8 km

(0.5 mi) e Little Gilson Butte, 1 ♂, 1 ♀, 15-IX-1985 (D. K. Broemeling); 0.8 km (1/2 air mi) NE Little Gilson Bt, 1540 m (5050'), 2 ♂ ♂, 12-IX-1983 (Parkers/Griswold); 0.8 km (1/2 mi) E Little Gilson Butte, 1550 m (5100'), *Helianthus anomalous* 1 ♀, 27-VIII-1985 (T. L. Griswold), 4 ♂ ♂, 27-VIII-1985 (T. L. Griswold), 3 ♂ ♂, 2 ♀ ♀, 27-VIII-1985 (D. K. Broemeling); 3.2 km (2 air mi) W Little Gilson Butte, 2 ♂ ♂, 1 ♀, 15/17-IX-1980 (T. Griswold), 1 ♂, 15/17-IX-1980 (F. Parker), 1 ♀, 15/17-IX-1980 (D. Veirs); 4.8 km (3 mi) N Little Gilson Butte, 1 ♀, 29-IX-1984 (D. K. Broemeling); 5.2 km (3.2 air mi) NE Little Gilson Bt., 1520 m (5000'), 1 ♀, 13-IX-1983 (Parkers/Griswold); 4.8 km (3 mi) SSE Temple Mt. SanRafaelDes, 1620 m (5300'), 1 ♀, 23-IX-1982 (FD/JH Parker); 6.4 km (4 air mi) N Gilson Bt, 1550 m (5100'), 4 ♂ ♂, 4 ♀ ♀, 12/14-IX-1983 (Parkers/Griswold), 1 ♂, 16/17-IX-1980 (T. Griswold), 2 ♂ ♂, 1 ♀, 26-VIII-1985 (D. K. Broemeling), 6 ♂ ♂, 26-VIII-1985 (F. D. Parker), 1 ♂, 26-VIII-1985 (T. L. Griswold), 1 ♂, 16/17-IX-1980 (T. Griswold); Gilson Bt. Well, 1550 m (5100'), 1 ♀, 20-IX-1985 *Helianthus anomalous* (W. P. Nye); Goblin Valley in Sand Dunes, 2 ♂ ♂, 3 ♀ ♀, 16-IX-1979 (F. D. Parker/D. Veirs); 6 ♀ ♀, 16-IX-1979 (C. Hatley/G. Briggs); Little Gilson Butte E. side, 1590 m (5200'), 3 ♀ ♀, 22-IX-1982 (FD/JH Parker); San Rafael Desert nr. Goblin Vly., 1 ♂, -IX-1980 (G. E. Bohart); WildHorse Cr. N Goblin Vly, 4 ♂ ♂, 1 ♀, 13-IX-1983 (Parkers/Griswold); Garfield Co., 3.2 km (2 mi) NE Henrieville, 1 ♀, 30-VIII-1985 (F. D. Parker), 1 ♀, 30-VIII-1985 (D. K. Broemeling); 9.7 km (6 mi) SE Escalante, 1 ♂, 1 ♀, 30-VIII-1985 (D. K. Broemeling); Sandy Cr. SSE of Notom, 1590 m (5200'), 1 ♂, 16-IX-1983 (FParker/TGriswold), 2 ♀ ♀, 16-IX-1983 (FParker/TGriswold), 2 ♀ ♀, 16-IX-1983 (J. H. Parker); Millard Co., Delta, 2 ♂ ♂, 15-VIII-1952 *Helianthus annuus* (G. E. Bohart, E. A. Cross), 3 ♂ ♂, 1 ♀, 20-VIII-1963 *Helianthus annuus* (G. E. Bohart), 2 ♂ ♂, 5-VIII-1948 (G. E. Bohart); Work Farm, N. Delta, 4 ♂ ♂, 6-VIII-1947 *Helianthus annuus* (G. E. Bohart); Piute Co., Circleville, 1 ♀, 8-IX-1978 (J. B. Karren); Salt Lake Co., Salt Lake City, 1 ♂, 11-VIII-1951 (R. B. Selander); San Juan Co., 8.1 km (5 mi) N Blanding, 1 ♂, 24-VIII-1967 (J. C. Hall) UCR; Uintah Co., Lower Jensen, 4.8 km (3 mi) SW Jensen, (Ian L. Bell), 1 ♂, 16-VIII-1949, 1 ♂, 9-IX-1949; Vernal, 1 ♂, 16-VIII-1949 (Lynn R. Nielson), 1 ♂, 18-VI-1936, 1 ♀, 20-VIII-1949 (Lynn R. Nielson); Utah Co., Provo, 1 ♂, 16-VIII-1947 (G. F. Knowlton); Washington Co., 1 ♂, 12-VIII-1959 (G. F. Knowlton); Zion Park, 1 ♀, 6-VIII-1966 (J. Kefuss); Wayne Co., 6.4 km (4 mi) SE Hanksville, 1 ♂, 28-IX-1985 *Helianthus annuus* (D. K. Broemeling); WYOMING: 19.3 km (12 mi) E. of Gillette, 1 ♂, 31-VIII-1962 *Helianthus* (S. M. Walder); Fremont Co., Baldwin Creek 4.8 km (3 mi) NW of Lander, 1680 m (5500'), 4 ♂ ♂, 10-VIII-1963 *Helianthus* (W. E. LaBerge);

Nomada (Pachynomada) zebrata Cresson

Nomada zebrata Cresson, 1978. American Hymenoptera. Amer. Ent. Soc. Trans. 7:73.

Lectotype Male.—"Col. 2589." Type Depository, Academy of Natural Sciences of Philadelphia.

Diagnosis.—3 submarginal cells, terga with yellow transverse median bands, antennal scape globose in males, sides of propodeum ferruginous with posterior yellow mark, long pubescence, mesopleuron with a complete longitudinal yellow band, slightly narrowed medially, not expanded anteriorly towards pronotal lobe.

Male.—Length 9.9–11.6 mm, forewing length 8.1–9.2 mm, hindwing length 6.1–6.9 mm; antennal scape globose, densely punctured on anterior outside half, sparsely punctate interiorly, IPS smooth and shiny, posterior virtually impunctate; first flagellar segment 1.4 times as long as second; IOD = OOD = MOOM, MLOD = MOD; head densely, evenly punctate, smooth shiny IPS; IPS dull, roughened within ocellar triangle; labrum glassy, impunctate median strip, produced slightly into a broad apical beak; acetabular carina strongly lamellate; prelobar carina short, heavy; pronotal ridge rounded anteriorly, broadly depressed medially, inner third impunctate; scutum deeply contiguously punctured, interpunctural spaces sharpened apically; tegulae with densely, shallowly, evenly punctate surface, glassy; metanotum flattened, broadened medially; propodeal disk reticulate rugose, with long transverse dorsal rugae, curling downward; propodeum swollen laterally, densely contiguously punctured, impunctate roughened band below spiracle; metapleuron with punctate ventral half; procoxal spine rudiments lacking; hind tibial apex with 7 weakly curved, ferruginous bristles in single row; forewing with 3 submarginal cells: COLOR: base color ferruginous; sides of face to antennal insertion, supraclypeal area, labrum, basal two-thirds of mandibles, pronotal ridge and lobes, tegulae, scutellum, metanotum, sides of propodeum, longitudinal mesopleural band (narrowed medially), apices of coxae, distal mid- and hind femora, proximal tibiae, transverse median bands on all terga (interrupted on tergum 1), pygidium, spot on sternum 1, extensive bands on remaining sterna, creamy yellow.

Females.—Length 9.9–12.4 mm, forewing length 8.1–8.7 mm, hindwing length 6.3–6.6 mm; differs from males by antennal scape not inflated, supraclypeal area ferruginous instead of yellow.

Discussion.—*Nomada zebrata* seems at present to be restricted to the southwestern United States, but it will probably be found in northern Mexico. It is characterized by the very swollen antennal scape of the males and a complete longitudinal yellow mesopleural band. Its range overlaps greatly with *utahensis*, and slightly with *vincta* in eastern Colorado. Specimens reported from Kansas and the Great Plains have proven to be misidentified *vincta*. Cresson's type series includes at least 3 *vincta*. One of the cotypes of Cockerell's *vincta heterochroa* is actually a specimen of *zebrata*. Some specimens from a recent series collected in Texas have some of the ferruginous body markings replaced with black.

Specimens examined.—U.S.A.: Brevolt Co. 25.0 km (15.5 mi) E. ?, 1 ♂, 15-IX-1961 *Verbesina* (Timberlake) LACM; ARIZONA: 32.2 km (20 mi) E. Pearce, 1 ♀ ♀, 1-X-1967 (F. Werner) UNAr; Apache Co., 36.5 km (22.7 mi) S. of Sanders, 1 ♂ 28-VIII-1986 *Sphaeralcea* sp. (R. R. Snelling); Springerville, 1 ♂, 25-VIII-1970 (Bill Apperson); Cochise Co., 6.4 km (4 mi) W. Portal, 1 ♀ ♀, 26-IX-1982 (W. J. Pulawski); Onion Saddle, Chiricahua Mtns., 1 ♀ ♀, 3-IX-1959 (J. R. Powers); Coconino Co., 11.3 km (7 mi) S Flagstaff, 2 ♀ ♀, 12-16/IX/1961 *Grindelia* (G. Butler), 1 ♂, 12-16/IX/1961 *Grindelia* (G. Butler); 32.2 km (20 mi) SW of Flagstaff 1 ♂, 18-IX-1966 (R. S. Beal); Flagstaff, 1 ♀ ♀, 9-IX-1951 (A. T. McClay); Greenlee Co., 62.8 km (39 mi) S Hannagan Meadows, 1 ♂, 1 ♀, 13-IX-1985 *Helianthus* (d. K. Broemeling); Yavapai Co., Paulden, 3.2 km (2 mi N.), 1 ♂, 14-IX-1961 *Gutierrezia microcephala* (P. D. Hurd); COLORADO: Cabin Canon, 1 ♀, 31-VIII-1921 (Hugo G. Rodeck); Denver, 1 ♂, 10-VI-1960; Boulder Co., Boulder, 1650 m (5400'), 1 ♀, 5-IX-1976 *Grindelia* (P. Robinson); N. of

Marshall, 1 ♀, 12-IX-1946 *Grindelia* (Hugo G. Rodeck); El Paso Co., Colorado Springs, 1 ♀; Rock Creek vic. Colorado Sprgs, 1 ♂, 19-VIII-1937; Fremont Co., 8.1 km (5 mi) S. Coaldale, 2230 m (7300'), 1 ♂, 13-VIII-1969 (C. D. Michener); Las Animas Co., Kim, 37.0 km (23 mi) N., 1 ♀, 22-VIII-1967 *Haplopappus* (R. R. Snelling); NEW MEXICO: Grant Co., Hachita, 12.9 km (8 mi) W., 1 ♂, 5-IX-1972 (R. R. Snelling); Otero Co., Cloudcroft, 2590-2740 m (8500-9000'), 2 ♂♂, 6-IX-1963 (H. V. Weems, Jr.); Torrance Co., Town of Gran Quivira, 1990 m (6500'), 1 ♂, 20-VIII-1967 (Hugh B. Leach); TEXAS: Jeff Davis Co., High Lonesome Ridge, Davis Mts. 2320 m (7600') 17 ♂♂, 3 ♀♀, 6-IX-1986 *Verbesina encelioides* (R. R. Snelling), 1 ♂ same but no floral record; Madera Can. rest stop on Rd. 118, 1 ♀, 16-X-1977 (James R. Zimmerman), NMex; Upper Limpia Cyn., Davis Mts. 1710 m (5600') 30-VIII-1986 (R. R. Snelling), 3 ♂♂, (one each on *Bidens* sp. and *Verbesina encelioides*).

BOHARTORUM GROUP

Nomada (Pachynomada) bohartorum Moalif NEW SPECIES

Holotype Female.—"Mex. Jalisco, Tepatitlan, X-3-66, GE & AS Bohart." Type Depository, United States National Museum.

Diagnosis.—3 sub-marginal cells, antennal scape not globose (slightly expanded apically), terga with complete transverse median bands, sides of propodeum black with long pubescence, thorax black or black with ferruginous (never entirely ferruginous), females with 5 hind tibial apical bristles, strongly curved, somewhat flattened.

Male.—Length 8.2 mm, forewing length 6.9 mm, hindwing length 5.3 mm; antennal scape moderately punctate anteriorly, impunctate posteriorly, IPS polished, somewhat roughened anteriorly, posterior quarter of scape apilose; first flagellar segment twice length of second; IOD < OOD < MOOM, MLOD < MOD; head densely, deeply punctured, glassy IPS; raised impunctate bump posterior to line between lateral ocelli; labrum distended into large flattened beak medio-apically; acetabular carina with distinct lamella; prelobar carina thin; pronotal ridge somewhat angulate anteriorly, broadly depressed medially; scutum with typical punctation; tegulae lightly punctured; scutellum distinctly depressed medially; sides of propodeum densely punctate, clothed with fine, long (0.15 mm) pubescence, broad, shiny, virtually impunctate band along lower margin, reaching dorsally to spiracular depression; mesopleuron with glassy IPS, roughened dorsal to hypoepimeral prominence; ventral half of metapleuron glassy, impunctate; slight procoxal spine rudiment present; hind tibial apex with 3 clear, long, rather strongly curved bristles; forewing with 3 submarginal cells: COLOR: face up to level of clypeus, short extension dorsally along compound eyes, basal half of mandibles, pronotal ridge and lobes, outer two-thirds of tegulae, scutellum, anterior of fore-femora, abdominal terga (T-1 divided medially), yellow; remainder of body dark brown to black.

Female.—Length 8.5 mm; forewing length 7.3 mm; hindwing length 5.6 mm; scape shallowly punctured, with shiny, shagreened interpunctural areas; IOD < OOD = MOOM, MLOD < MOD; impunctate, roughened median hump behind ocellar triangle; labrum produced into an apical wedge, bearing a narrow median impunctate band; acetabular carina strong, angulate; prelobar carina thick;

pronotal ridge rounded apically with smooth impunctate median area; scutal puncture rims angulate; tegulae evenly, shallowly punctate; scutellum depressed medially; sides of propodeum covered with long hairs (0.17 mm); hypoepimeral area not prominently swollen; metapleuron with ventral half highly polished, impunctate; pro-coxal spine rudiments lacking; hind tibial apex with 5 ferruginous spines, anterior 3 strongly curved, flattened; forewing with 3 submarginal cells: COLOR: scape, pedicel, first flagellar segment, ring around compound eyes, face to base of clypeus, labrum, basal two-thirds of mandibles, tegulae, most of mesopleuron, apices of coxae, legs, medial spot on sternum I, remaining sterna, ferruginous: pronotal ridge and lobes, scutellum, anterior mesopleural spot, divided median transverse band on tergum 1, tergum 2 and 3 except baso-medial inclusion and apical band, tergum 4 and 5 except apical band, transverse bands on sternum 2–5, yellow; remainder of body black.

Discussion.—*Nomada bohartorum* is a small western Mexican species. The flattened hind tibial bristles which are strongly curved apically are its most distinctive feature. These bristles are less pronounced in the males. The male is very similar morphologically to *tepoztlan*, but the integument of *bohartorum* is black rather than light brown, and the genital capsules are somewhat different.

Specimens examined.—MEXICO: DURANGO: 9.7 km (6 mi) W. Paraiso, 2010 m (6600'), 1 ♀, 23-IX-1950 (Ray F. Smith); SINALOA: El Palmito on Rt. 40, 1830–1990 m (6000–6500'), 1 M, 3-IX-1963 (H. V. Weems, Jr.);

Nomada (Pachynomada) tepoztlan Moalif NEW SPECIES

Holotype Male.—"Tepoztlan(!), Morelos, Mex. 9-26-57, R. & K. Dreisbach." Type Depository, Michigan State University.

Diagnosis.—3 submarginal cells, antennal scape not globose, abdominal terga with complete transverse median bands, sides of propodeum with long pubescence, head and thorax a uniform light brown.

Male.—Length 7.4 mm; forewing length 6.2 mm, hindwing length 4.8 mm; scale slightly swollen apically, moderately punctate, IPS shiny, shagreened in places; IOD < OOD = MOOM, MLOD < MOD; labrum thickened medio-apically, narrow impunctate strip extending down middle; acetabular carina prominent; prelobar carina abbreviated; pronotal ridge polished, sparsely punctate, shallowly depressed medially, apex rounded, broad impunctate medial area; tegulae evenly, shallowly punctured, glassy; scutal punctures with angulate rims; scutellum slightly depressed medially; metanotum flattened; propodeum with highly polished impunctate lateral ventral band extending upwards to spiracle; ventral band extending upwards to spiracle; ventral half of metapleuron impunctate, highly polished; procoxal spine rudiment absent; hind tibial apex with 5 light bristles, curved at about half their length; forewing with 3 submarginal cells: COLOR: uniform light brown, except; clypeus, face below clypeo-frontal suture, labrum, basal half of mandibles, pronotal ridge and lobes, tegulae, scutellum, metanotum, apices of fore- and mid femora, tibial bases, fore- and mid tibial apices, fore- and mid tarsi, medially narrowed transverse band on tergum 1–5, broad transverse band on sternum 1, yellow.

Discussion.—This is the smallest of the species of *Pachynomada*. It is no larger than most *Nomadita* species, but it has all the distinguishing characteristics of the subgenus *Pachynomada*.

VITTICOLLIS GROUP

Nomada (Pachynomada) dreisbachorum Moalif NEW SPECIES

Holotype Male.—"Amecameca, Mex. 9-25-57, R. & K. Dreisbach." Type Depository, Michigan State University.

Diagnosis.—2 submarginal cells, antennal scape not at all swollen, propodeum and scape clothed with very long hair (more than two-thirds length of scape), body black with greatly reduced yellow markings, IPS of face dull and quite roughened, pro-coxal spine rudiment strong, hind basitarsus only slightly expanded medially.

Male.—Length 9.6–12.7 mm; forewing length 8.9–10.1 mm; hindwing length 6.9–8.1 mm; antennal scape not inflated (fig. 3), covered with unusually shallow, flattened punctures, IPS dull, coarsely shagreened; IOD < OOD < MOOM, MLOD < MOD; head covered with round, shallow punctures, IPS dull and coarsely roughened; labrum with IPS quite polished, apex produced into thick, prominent beak; acetabular carina unusually short but strongly lamellate; prelobar carina reduced to an angulation; pronotal ridge apex protruberant but rounded; IPS of scutum somewhat roughened; scutellum flattened dorsally, slightly depressed medially, entire IPS roughened; sides of propodeum densely, shallowly punctate, IPS quite roughened, covered with long slender hairs (0.22 mm); mesopleuron more sparsely punctured, punctures shallow, IPS dull, quite roughened; metapleuron with ventral half impunctate, shiny, only slightly roughened; pro-coxal spine rudiment strongly developed; hind tibial apex with long, thin, pale bristles, difficult to distinguish from surrounding hairs; forewings with two submarginal cells, but some specimens may bear a short rudiment of first transverse cubital vein, wings dark around outer margin, clear interiorly; sternum 1 with traces of a median longitudinal carina: COLOR: spot at apex of clypeus and at apex of compound eye, tips of pronotal lobes, pronotal ridge, two spots on scutellum, metanotum, thin transverse median band on abdominal terga, patches on sterna 1–3, yellow; remainder of body black.

Discussion.—This species is the furthest from the norm of *Pachynomada*. The genitalia are clearly that of *Pachynomada*, although the gonostylus is unusually short. One specimen examined shows a trace of the first transverse cubital vein in the forewing. This may mean that long series of *dreisbachorum* would contain specimens with 2 or 3 submarginal cells. The genus *Hypochrotaenia* (formerly the subgenus *Micronomada*) shows great variability in the number of submarginal cells, and there are a number of specimens which have 3 cells on one forewing and two cells on the other (pers. obs.). *Nomada dreisbachorum* can still be distinguished by the long pubescence on the antennal scape (which is not globose, as in many male *Pachynomada* species), and the dull, shagreened interpunctural surface of the head.

Paratypes.—4 males with same data as holotype. Three deposited at Michigan State University, and one in the Bee Biology & Systematics Lab in Utah.

Additional specimens examined.—MEXICO: 64.4 km (40 mi) W. of Puebla Pue., 2800 m (9200'), 1 ♂ 7-IX-1957 (H. A. Scullen) ORSU; D. F.: 29.0 km (18 mi) S. of Mexico City, 2800 m (9200'), 1 ♂, 10-IX-1957 (H. A. Scullen) ORSU;

Nomada (Pachynomada) vitticollis Cresson

Nomada vitticollis Cresson, 1878. Trans. Amer. Entomol. Soc. 7:78.

Holotype Female.—"Mex. 2562." Type Depository, Academy of Natural Sciences of Philadelphia.

Diagnosis.—3 submarginal cells, thorax almost entirely yellow except for brown sutures, sides of propodeum with long pubescence, interpunctural surface of face smooth, shiny.

Male.—Unknown.

Female.—Length 8.9–12.1 mm, forewing length 8.0–9.6 mm, hindwing length 6.2–7.3 mm; antennal scape sparsely, shallowly punctured, IPS shagreened; first flagellar segment subequal to second; IOD = OOD = MOOM, MLOD < MOD; head densely, evenly punctate with some deformation, IPS shiny, somewhat roughened; labrum sparsely punctate, shiny impunctate apico-medially, protruding wedge-shaped beak; acetabular carina small, distinctly lamellate; mandibles virtually impunctate; prelobar carina abbreviated, pronotal ridge rounded anteriorly, broadly depressed medially; roughened IPS postero-medially; metanotum shallowly and broadly punctured; sides of propodeum shallowly and broadly punctured, IPS shagreened, dull, pubescence 0.3 mm long; hypoepimeral area not strongly protruberant; ventral half of metapleuron glassy, impunctate; procoxal spine rudiment absent; hind tibial apex with 8 bristles; forewing with 3 submarginal cells: COLOR: scape, supraclypeal area, spot anterior to mid-ocellus, ring around compound eyes, pronotum (except anterior to pronotal ridge and between ridge and collar), lateral margins of scutum and two median longitudinal stripes, scutellum, metanotum, tegulae, axillary sclerites, propodeum (except median stripe), mesopleuron and metapleuron except sutures, legs (except dorsal stripe on fore- and mid femora, ventral hind femora, interior of hind tibiae), abdomen, bright yellow; remainder of body dark brown.

Discussion.—This species is similar to *dreisbachelorum* in form; both species have a long, fairly thin body, unusually long pubescence and similar punctation patterns. *Nomada vitticollis* differs from *dreisbachelorum* by its almost completely yellow head and thoracic pleura, 3 submarginal cells in forewings, distinctly inflated hind basitarsus, and the IPS of the face (shiny and smooth in *vitticollis*, dull and shagreened in *dreisbachelorum*). The holotype is quite a bit smaller than the other specimens examined, and the majority of future specimens will probably be closer in size to the large specimens.

Specimens examined.—MEXICO: SAN LUIS POTOSI: 83.7 km (52 mi) S. of Tamazunchale, 1710 m (5600'), 1 ♀, 7-X-1957 (H. A. Scullen) ORSU; TAMAULIPAS: Rancho del Cielo 11.3 km (7 mi) W. Gomez Farias, 1 ♀, 4-6/XI/1972 (J. A. Gillaspay);

ASTERIS GROUP

Nomada (Pachynomada) asteris Swenk

Nomada (Homonamada) asteris Swenk, 1913. Nebr. Univ. Studies 12:89.

Holotype Female.—“Manhattan, Kansas, September 19, 1908, on *Aster paniculatus* (O. A. Stevens, No. 1203).” Type Depository, University of Nebraska, Lincoln.

Diagnosis.—3 submarginal cells, female rufo-ferruginous, abdomen lacking complete transverse bands; male antennal scape globose, abdomen with complete transverse median bands, sides of propodeum black with long pubescence, antennal scape uniform ferruginous color, mesopleuron ferruginous.

Male.—Length 8.9–10.4 mm, forewing length 5.9–7.0 mm, hindwing length 4.9–5.9 mm; antennal scape globose, densely punctate, glassy IPS, tuft of hair on posterior apical shelf; IOD = OOD, MLOD < MOD; labrum lacking median

impunctate strip, produced into small beak apically; prelobar carina somewhat thickened; pronotal ridge sharply angulate anteriorly; interpunctural spaces of scutum slightly rounded; tegulae moderately punctate, glassy; scutellum flattened, glassy, only slightly depressed medially, metanotum rather strongly rounded medially, roughened posteromedial interpunctural surface reduced; surface of metanotum glassy; propodeal sides deeply punctured, dull, rough IPS, pubescence long (0.2 mm); mesopleural surface quite shiny, only slightly roughened in places; metapleuron glassy, punctate; procoxal spine rudiment virtually absent; hind tibial apex with 7 or 8 thin, pale ferruginous bristles; metasternum grooved medially; pygidium rather broad, shallowly emarginate medially; forewing with 3 submarginal cells, apex somewhat darkened: COLOR: supraclypeal area, sides of face up to and around antennal sockets (extending along sides of compound eyes), labrum, clypeus, basal two-thirds of mandibles, malar space, ring extending behind compound eyes almost to vertex, pronotal lobes, ridge, tegulae, scutellum, metanotum, small anterior mesopleural spot, apices of coxae, transverse median bands on terga (emarginate antero-medially), creamy-white; antennae, legs, most of mesopleuron, abdominal sterna, ferruginous; remainder of body dark fuscous to black.

Female.—Length 7.7 mm; antennal scape heavily punctate, IPS shagreened to shiny, IOD = OOD, MLOD < MOD, head densely evenly punctate, IPS highly polished, supra-clypeal area prominent, labrum with strong triangular median sub-apical beak extending into a sub-apical ridge laterally; mandibles robust with a strong dorsal ridge; acetabular carina prominent, semicircular, slightly lamellate; pre-malar carina strong dorsally, undifferentiated ventrally; pre-occipital ridge rounded; pronotal ridge very thin medially; apex rounded; pre-lobar carina thick, sloping gradually; scutum deeply punctured (honey-combed), punctural rims sharply angulate, tegulae polished, densely punctured; scutellum highly polished, glassy, sparsely punctate, very slightly depressed medially; postero-medial IPS smooth, not shagreened or micro-rugose; metanotum very shiny, sparsely punctate; supra-spiracular ridge undeveloped; hypo-spiracular band impunctate with light vertical rugae, hairs 0.15 mm long, sparse; hypoepimeral prominence flattened; mesopleuron deeply, nearly contiguously punctured with smooth-shiny IPS; metapleuron shiny, punctate; pro-coxal spine rudiments lacking; hind tibial apex with 5 fine, evenly spaced, pale ferruginous bristles; hind basitarsus not as inflated as other *Pachynomada*, widest point closer to base; hindwings with 3 sub-marginal cells, smokey with clear sub-apical crescents; abdominal sterna punctate, heavily shagreened; terga densely, evenly punctate, heavily shagreened IPS; apical impunctate bands narrow: COLOR: body is uniform, light rufo-ferruginous; apex of mandibles, posterior-medial triangle on scutum, areas of abdomen darkened to fuscous, pronotal lobes, apices of pronotal ridge, scutellum, metanotum, medial lateral patches on terga 2, 3, and 4 creamy white.

Discussion.—*Nomada asteris* and *victrix* are sexually dimorphic, which is unusual in this subgenus. This rare species has only been collected in Kansas.

Specimens examined.—U.S.A.: KANSAS: Reece, 12 ♂♂, 7-IX-1949 *Amphiachyris dracunculoides* (Michener-Beamer);

Nomada (Pachynomada) besseyi Swenk

Nomada (Holonomada) besseyi Swenk. 1913. Nebr. Univ. Studies 12:85.

Holotype Male.—"Manhattan, Kansas, August 24, 1908, on *Helianthus tuberosus* (O. A. Stevens, No. 933)." Type Depository, University of Nebraska, Lincoln.

Diagnosis.—3 sub-marginal cells, antennal scape globose in males, propodeum black and appearing naked (pubescence is sparse and no longer than a puncture diameter).

Male.—Length 9.0–11.3 mm, forewing length 6.7–8.1 mm, hindwing length 5.0–5.9 mm; antennal scape globose, sparsely punctate, with smooth shiny IPS; labrum with small median wedge, apical margin upturned; acetabular carina strongly lamellate; prelobar carina thickened, sloping gradually to pronotal lobe; pronotal ridge rounded apically, very shallowly depressed, impunctate medially; scutum with contiguous, frequently reticulate punctures, punctural rims angulate; scutellum deeply depressed medially; metanotum protruberant; propodeum appearing naked (pubescence very sparse and short (0.05 mm)); mesopleural IPS glassy, shagreened dorsal to hypoepimeral prominence; ventral half of metapleuron glassy, impunctate; pro-coxal spine rudiment reduced to slight bump; hind tibial apex with six straight, pale bristles; forewing with 3 submarginal cells, brown with pale subapical area: Color: fuscous to black; with antennal base, interantennal area, sides of face to vertex, clypeus (except sutures and median band), labrum, small basal mandibular spot, partial ring behind eye, pronotal ridge and lobes, outer four-fifths of tegulae, lobes of scutellum, metanotum, longitudinal mesopleural band, apices of coxae, postero-apical stripe on femora, exterior of tibiae, posterior stripe on hind basitarsus, thin transverse median band on abdominal terga, sterna 2 and 3, broken band on sterna 4 and 5, yellow; antennal scape (in part), first flagellar segment, ferruginous.

Females.—Length 8.9–11.3 mm, forewing length 7.4–8.1 mm, hindwing length 5.5–6.2 mm; virtually identical to male except for terminalia and antennal scape not inflated.

Note.—There is a variant form with thicker tergal banding, middle of clypeus and supraclypeal area yellow. It has been collected from the same date and location as the typical form, so it does not constitute a subspecies.

Discussion.—*Nomada besseyi* is similar to the *Vincta* group, but the extremely short and sparse pilosity of the propodeum differs from that group. It is similar in this aspect to *asteris* and *victrix*, which have short pubescence. Their propodeal pubescence however, is fairly dense and about twice as long as that of *besseyi*.

Specimens examined.—U.S.A.: MARYLAND: near Plummers Id., 1 ♂, 29–VIII–1915 (R. C. Shannon); MICHIGAN: Kalamazoo Co., Gull Lake Bio. Sta., 1 ♀, 12–VIII–1969 (Roland L. Fischer), 1 ♂, 27–VII–1963 (G. C. Eickwort), 1 ♂, 1 ♀, 6–VIII–1959 (Roland L. Fischer), 1 ♀, 5–VIII–1969 (Roland L. Fischer); MINNESOTA: Carver Co., Zumbra Heights, 1 ♂, 31–VIII–1921 (Irwin C. Alfonsus); NORTH CAROLINA: Bryson City, *Helianthus atrorubens*, (J. C. Crawford), 1 ♂, 1 ♀, 20–VIII–1923, 1 ♀, 26–VIII–1923, 1 ♂, 31–VIII–1923 (J. C. Crawford) LACM, 5 ♂♂, 4–IX–1923 *Rudbeckia laciniata*; Marion, 4 ♂♂, 1 ♀, 2–IX–1929 NCSt, 1 ♂, 27–VIII–1930 NCSt, 1 ♂ 28–VIII–1930, 1 ♀ 28–VIII–1931, 2 ♂♂, 29–VIII–1928 *Heliopsis* (T. B. Mitchell), 1 ♀, 29–VIII–1929 Boul, q ♂, 29–VIII–1930 *Rudbeckia lanceolata* NCSt, 1 ♂, 29–VIII–1930 NCSt, 2 ♂♂, 30–VIII–1931, 1 ♂, 31–VIII–1929 NCSt; Raleigh, 1 ♀, 10–IV–1961; Valley of Black Mts., 1 ♀, 4–IX–1906 (W. Beutenmuller); Haywood Co., Lake Junaluska, 1 ♂, 5–VIII–1975 (H. V. Weems, Jr.); NEW JERSEY: Haddon Hts., 1 ♂, 10–IX–1939; NEW YORK: Armonk, 1 ♀, 25–VIII–1936 (L. L. Pechuman); West Point, 1 ♂, 2–IX–1923 (W. Robinson); VIRGINIA: Hunter, 1 ♀, 12–18/IX (R. A. Cushman); WISCONSIN: Milwaukee, 1 ♀, (W. H. Ashmead);

VICTRIX GROUP

Nomada (Pachynomada) victrix Cockerell

Nomada victrix Cockerell, 1911. Proc. U.S. Nat. Mus. 39:647.

Holotype Female.—“Victoria Tex, Nov. 6-'4, on Aster; Type no. 13436.” Type Depository, United States National Museum.

Diagnosis.—2 submarginal cells, hind coxae with a posterior dorsal carina extending more than half the length of coxa, females rufo-ferruginous, abdominal terga with yellow maculations, males darker, scape somewhat swollen, sides of propodeum with dense, short pubescence.

Male.—Length 7.3–9.9 mm; forewing length 5.3–6.3 mm, hindwing 4.1–4.9 mm; differs from female in wide transverse yellow bands on all terga, sometimes narrowly interrupted medially; clypeus and sides of face, pronotal ridge and lobes, scutellum, yellow; antennal scape swollen, body fusco-ferruginous to black.

Female.—Length 8.9–9.3 mm, forewing length 5.9–6.1 mm, hindwing length 4.7–4.8 mm; antennal scape sparsely, shallowly punctured, IPS, shagreened; IOD = OOD = MOOM, MLOD < MOD; clypeus polished, more sparsely punctate than remainder of head; labrum carinate around margin, produced into a sharp ridge apically, lacking median impunctate strip, but apico-medial area impunctate; acetabular carina reduced to small basal lamella only; prelobar carina reduced; pronotal ridge rounded anteriorly; scutum with normal punctation; tegulae glassy, virtually impunctate; scutellum flattened, unusually sparsely punctate, highly polished, posteromedial portion without roughened interpunctural surface; metanotum not flattened; propodeal disk with delicate, arching apical rugae; sides of propodeum heavily punctured, clothed with short hairs (0.1 mm); metapleuron with ventral half highly polished, virtually impunctate; pro-coxal spine rudiment absent; hind tibial apex with six ferruginous, straight bristles; hind coxae with pronounced dorsal posterior carina, extending over one-half length of coxa; abdominal terga with punctures very shallow; forewing with two submarginal cells: COLOR: light ferruginous, scutum somewhat darker, terga 2, 3, and 4 with small, lateral medial cream colored patches.

Discussion.—The strong carina on the hind coxa of this species is unique within the subgenus. It can be immediately separated on this character without reference to the two submarginal cells of the forewing. This may be primarily a Mexican species whose range barely extends into the United States.

Specimens examined.—MEXICO: JALISCO: Lagos de Moreno, 1 ♂, 19–VIII–1960 (P. H. Arnaud, E. S. Ross, D. C. Rentz), CAS; VERACRUZ: Rio Metlac, Fortin de las Flores, 1 ♂, 3–IX–1975 (J. Powell) UCB; U.S.A.: TEXAS: Roosevelt, 1 ♂, 25–IX–1906 *Amphiachyris*, (F. C. Pratt); Victoria, 4 ♀♀, 6–XI–1904 *Aster*;

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LITERATURE CITED

- Cockerell, T. D. A. 1903. New American Hymenoptera, mostly of the genus *Nomada*. *Ann. Mag. Nat. Hist.*, 12:200-214.
- . 1911. Bees in the collection of the United States National Museum-1. *Proc. U.S. Natl. Mus.*, 39:635-658.
- . 1919. Bees in the collection of the United States National Museum-3. *Proc. U.S. Natl. Mus.*, 55:167-221.
- . 1921. Western bees obtained by the American Museum Expeditions. *Am. Mus. Novit.*, 24:1-15.
- . 1922. Bees in the collection of the United States National Museum-4. *Proc. U.S. Natl. Mus.*, 60:1-20.
- Cresson, E. T. 1878. Descriptions of new North American Hymenoptera in the collection of the American Entomological Society. *Trans. Am. Entomol. Soc. (Phila.)*, 7:61-136.
- Michener, C. D. 1944. Comparative external morphology, phylogeny and a classification of the bees (Hymenoptera). *Bull. Am. Mus. Nat. Hist.*, 82:151-326.
- Moalif, A. S. 1979. A revision of the subgenus *Pachynomada* of the genus *Nomada* (Hymenoptera: Anthophoridae). Thesis, Utah State University, Logan, 54 pp.
- Parker, F. D., G. E. Bohart. 1982. Notes on the biology of *Andrena (Callandrena) helianthi* Robertson (Hymenoptera: Andrenidae). *Pan-Pac. Entomol.*, 58:111-116.
- , T. Griswold. 1982. Biological notes on *Andrena (Callandrena) haynesi* (Viereck and Cockerell (Hymenoptera: Andrenidae). *Pan-Pac. Entomol.*, 58:284-287.
- Rodeck, H. G. 1945. Two new subgenera of *Nomada* Scopoli (Hym.: Apoidea). *Entomol. News*, LVI:179-181.
- Say, T. 1837. Descriptions of new species of North American Hymenoptera, and observations on some already described. *Boston Journal of Natural History*, 1:361-416.
- Snelling, R. R. 1986. Contributions toward a revision of the new world nomadine bees. A partitioning of the genus *Nomada* (Hymenoptera: Anthophoridae). *Nat. Hist. Mus. Los. Ang. Cty. Contrib. Sci.*, 376:32 pp.
- Swenk, M. H. 1913. Studies of North American bees. I. Family Nomadidae. *University Studies*, University of Nebraska, 12:1-113.